

CHM 6154: Chemical Separations

Fall 2023

COURSE INFORMATION

Instructor:	Yong Zeng
Office:	CLB311C
Email:	zengy@ufl.edu
Lectures:	Mon, Wed, Fri, 8:30-9:20 AM (Period 2)
Room:	FLI0109
Course website:	E-learning (Canvas)
Office hours:	By appointments
Textbook:	<i>Unified Separation Science</i> by J. Calvin Giddings (1991, John Wiley & Sons, INC)
Reading:	<i>Principles and Practice of Modern Chromatographic Methods</i> by K. Robards, P.R. Haddad and P. E. Jackson (Academic Press) <i>The Essence of Chromatography</i> by Colin Poole (Elsevier)
Prerequisite:	Background in thermodynamics and calculus

OBJECTIVES

This course is designed to provide students in-depth understanding of separation theories and processes, practical knowledge of method development to optimize the separation performance for specific chromatographic techniques, and familiarity with the state-of-the-art development in separation science and applications. The topics of this course include:

1. Theoretical Fundamentals of Separation Science;
2. Gas and Liquid Chromatography;
3. Electrophoresis;
4. Other Separation Techniques;
5. Overview of Method Development.
6. Research Proposal Writing (NIH)

EVALUATION

Evaluation of Grades

Assignment	Points	Final Grade
Quizzes	10 each	10%
Midterm Exam	100	30%
Final Exam	100	35%
Presentation	100	10%
Research Proposal	100	15%
Overall		100%

Grading. All grade calculations will be done on a percentage basis. The final grade will be a weighted average of all components. The letter grades will be assigned according to the following scale:

Percent	Grade	Grade Points
90.0 - 100.0	A	4.00
87.0 - 89.9	A-	3.67
84.0 - 86.9	B+	3.33
81.0 - 83.9	B	3.00
78.0 - 80.9	B-	2.67
75.0 - 79.9	C+	2.33
72.0 - 74.9	C	2.00
69.0 - 71.9	C-	1.67
66.0 - 68.9	D+	1.33
63.0 - 65.9	D	1.00
60.0 - 62.9	D-	0.67
0 - 59.9	F	0.00

COURSE POLICIES

Attendance: Attendance is required. Each unexcused absence will result in a **3-point reduction** in the final grade. Excused absences must be consistent with university policies in the Graduate Catalog (<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#attendance>) and require appropriate documentation. Please see below for the information related to COVID-19.

Homework: Problem sets will be assigned as an aid in comprehending the course material. They are **NOT** graded but students are urged to master these problem sets. Answers to the problem sets will be discussed and all posted on the class E-learning website.

Quizzes and Exams: Pop quizzes will be given throughout the course to help review the course material constantly. **Two in-class exams** will be given for this course. The midterm exam will be a 2-hour written exam and the final exam is a comprehensive 2-hour written exam.

Research Proposal & Presentation: The Research Proposal should describe the development and assessment of an innovative separation method/technique to address a specific application. This proposal should be structured as a NIH proposal, which includes one-page Specific Aims, followed by the Research Strategy. The Research Strategy part contains three sections: Significance, Innovation, and Approach. A separate document will be provided to give you details regarding the important due dates, proposal format, and oral presentation. The written proposal will be submitted with the final due date on **December 10**. Late submission will not be accepted.

Make-Up Policy: There is **NO** make-ups for quizzes. Once permitted by the instructor, the grade for the missed quizzes will be replaced by the average grade of other quizzes. A make-up exam will be provided for students who miss either midterm or final exam due to extreme, documented circumstances. Students should arrange with the instructor the time for the make-up exam.

University Honesty Policy: UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are

obligated to report any condition that facilitates academic misconduct to appropriate personnel.

For academic misconduct in this course, *at the very minimum, you will receive a grade of zero on any work in which you violate these integrity standards and all violations will be reported to the appropriate University officials.* The instructor reserves the right to retain copies of all submitted work.

Recording of lectures (for Zoom-based virtual lectures): Our lecture sessions may be audio-visually recorded by instructor for students in the class to refer back and for enrolled students who are unable to attend live. Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate orally are agreeing to have their voice recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live. The chat will not be recorded or shared. Unauthorized recording and unauthorized sharing of recorded materials by students or any other party is prohibited.

COVID-19 Information: In response to COVID-19, the following recommendations are in place to maintain your learning environment, to enhance the safety of our in-classroom interactions, and to further the health and safety of ourselves, our neighbors, and our loved ones.

- If you are not vaccinated, get vaccinated. Vaccines are readily available and have been demonstrated to be safe and effective against the COVID-19 virus. Visit one.ufl.edu for screening / testing and vaccination opportunities.
- If you are sick, stay home. Please call your primary care provider if you are ill and need immediate care or the UF Student Health Care Center at **352-392-1161** to be evaluated.
- Course materials will be provided to you with an excused absence, and you will be given a reasonable amount of time to make up work.

TENTATIVE TIMELINE

Timeline	Topic	Reading Chapters
Aug 23	Course introduction	
Aug 25 -- Aug 30	Separation and Equilibrium	Giddings: 1, 2
Sept 1	Thermodynamics of Chromatography	Giddings: 2 R.H.J.: 2, 5
Sept 4	Labor Day, no class	
Sept 6 – Sept 8	Thermodynamics of Chromatography	Giddings: 2 R.H.J.: 2, 5
Sept 11 -- Sept 15	Mass Transport in Separation	Giddings: 3, 4
Sept 18 -- Sept 22	Basic Chromatography Theory	Giddings: 1, 10, 11, 12 R.H.J.: 1, 2, 3, 5
Sept 25 – Oct 2	Rate Theory and Bandbroadening	Giddings: 5, 6 R.H.J.: 6, 9
Oct 4	Review	
Oct 6	Homecoming, no class	
Oct 9	Midterm Exam	In person
Oct 11 -- Oct 13	Gas Chromatography	Giddings: 10.4, 12.2 R.H.J.: 3
Oct 16	No class, literature research for NIH proposal	
Oct 18 -- Oct 25	Liquid Chromatography	Giddings: 12 R.H.J.: 5, 6, 8, 9
Oct 27 – Oct 30	Other Chromatography Methods	Giddings: 7
Nov 1 -- Nov 6	Electrophoresis theory	Giddings: 4.9, 8
Nov 8 -- Nov 13	Capillary Electrophoresis	Giddings: 4.9, 8
Nov 15- Nov 20	Other Separation Methods	Giddings: 8, 9
Nov 22 -- Nov 24	Thanksgiving break, no class	
Nov 27 – Dec 1	Research Presentations	
Dec 4 – Dec 6	Review; complete NIH proposal	
Dec 14	Final Exam, 12:30 PM – 2:30 PM	Cumulative, in person